

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

In re application of: Mazumder et al.

Serial No.: 09/916,566

Group No.: 2123

Filed: July 27, 2001

Examiner: K. Bahta

For: DIRECT METAL DEPOSITION APPARATUS UTILIZING RAPID-RESPONSE DIODE  
LASER SOURCE

**APPELLANTS' BRIEF UNDER 37 CFR §41.37**

Mail Stop Appeal Brief  
Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

**I. Real Party in Interest**

The real party in interest in this case is The P.O.M. Group, a Michigan corporation, by assignment.

**II. Related Appeals and Interferences**

There are no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**III. Status of Claims**

The present application was filed with 1 claim. Claims 2-8 were added in July 2003, and claim 9 was added in October 2008. Claims 1-4 have been canceled. Claims 5-9 are pending, rejected and under appeal. Claims 5 and 9 are the independent claims.

**IV. Status of Amendments**

No after-final amendments have been filed.

**V. Summary of the Claimed Subject Matter**

Independent claim 5 is directed to a method of depositing material on a substrate, comprising the steps of heating the substrate with a high-power, rapid-response diode laser (Figure 5) to create a melt pool in a laser interaction zone (Specification, page 6, lines 13-17); feeding material into the melt pool to create a deposit having a physical dimension; monitoring the laser interaction zone directly, without using any source of energy other than the diode laser used to heat the substrate, to generate an optical signal indicative of the physical dimension (Specification, page 6, line 18 to page 7, line 4); and controlling the deposition using the optical signal. (Specification, page 7, lines 5-10).

Independent claim 9 is directed to a method of depositing material on a substrate, comprising the steps of a) heating the substrate with a high-power, rapid-response diode laser to create a melt pool in a laser interaction zone (Specification, page 6, lines 13-17); b) feeding material into the melt pool to create a deposit having a physical dimension; c) monitoring the laser interaction zone directly, without using any source of energy other than the diode laser used to heat the substrate, to generate an optical signal indicative of the physical dimension (Specification, page 6, line 18 to page 7, line 4); d) feeding the optical signal to the laser to adjust the output of the laser; and e) repeating steps c) and d) at a rate of up to 20 kHz to achieve a desired physical dimension. (Specification, page 7, lines 5-10).

**VI. Grounds of Rejection To Be Reviewed On Appeal**

A. The rejection of claims 5-7 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,046,426 to Jeantette *et al.* in view of U.S. Patent No. 6,526,327 to Kar *et al.*

B. The rejection of claims 5-7 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,837,960 to Lewis in view of U.S. Patent No. 6,046,426 to Jeantette *et al.* and further in view of U.S. Patent No. 6,526,327 to Kar *et al.*

C. The rejection of claims 8 and 9 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,046,426 to Jeantette *et al.* in view of U.S. Patent No. 6,526,327 to Kar *et al.* and U.S. Patent No. 5,837,960 to Lewis in view of U.S. Patent No. 6,046,426 to Jeantette *et al.* and further in view of U.S. Patent No. 6,526,327 to Kar *et al.*

## VII. Argument

### A. The Rejection of Claims 5-8 under 35 U.S.C. §103(a) over Jeantette *et al.* in view of Kar *et al.*

During prosecution, claim 5 was amended to include the step of “monitoring the laser interaction zone directly, without using any source of energy other than the diode laser used to heat the substrate, to generate an optical signal indicative of the physical dimension.”

In the “*Response to Amendment/Response to Arguments*” section of the Final OA, the Examiner states that the above-referenced newly added limitation is disclosed in the prior art “since Fig. 10 of Kar shows the heating sources is only diode laser.” (Final OA, top of page 7). The fact that a drawing in a secondary reference shows a certain piece of hardware is not enough establish *prima facie* obviousness with respect to a method claim. Rather, the Examiner needs to show that the combination of steps of at least claim 1 would be obvious to a person of skill in the art given the teachings of Jeantette in view of Kar *et al.* At least one of those steps, “monitoring the laser interaction zone directly, without using any source of energy other than the diode laser used to heat the substrate, to generate an optical signal indicative of the physical dimension,” is not taught by either reference.

Kar *et al.* do not teach optical feedback of any kind, and Jeantette *et al.* in all embodiments, intentionally uses a separate, dedicated laser source other than the laser used to heat the substrate for the purposes of triangulation.

“The laser-based triangulation device T uses a diode laser with wavelength *different from the deposition laser L* to avoid noise problem at the position-sensing detector. An optical filter is included to attenuate the light from the deposition laser L to below detectable levels.” (Jeantette *et al.*, 8:36-40, emphasis added).

Since the Jeantette/Kar *et al.* combination fails to teach each and every element of Appellant’s claims, *prima facie* obviousness has not been established.

### B. The Rejection of Claims 5-8 under 35 U.S.C. §103(a) over U.S. Patent No. 5,837,960 to Lewis in view of Jeantette *et al.* and further in view of Kar *et al.*

Here the Examiner argues that Lewis does not disclose some limitations of claims 5, 7-8 but Jeantette such limitations...” However, as discussed above with respect to the rejection of claims 5-8 under 35 U.S.C. §103(a) over Jeantette *et al.* in view of Kar *et al.*, Jeantette does not teach or suggest

the step of “monitoring the laser interaction zone directly, without using any source of energy other than the diode laser used to heat the substrate, to generate an optical signal indicative of the physical dimension.” Accordingly, *prima facie* obviousness has not been established.

- C. The rejection of claims 8 and 9 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,046,426 to Jeantette *et al.* in view of U.S. Patent No. 6,526,327 to Kar *et al.* and U.S. Patent No. 5,837,960 to Lewis in view of U.S. Patent No. 6,046,426 to Jeantette *et al.* and further in view of U.S. Patent No. 6,526,327 to Kar *et al.*

Claim 8 adds to claim 5 that the modulation of the laser is up to 20 kHz, and claim 9 includes repeating certain steps at a rate of up to 20 kHz to achieve a desired physical dimension. In this regard the Examiner only argues that “Jeantette discloses that any laser with sufficient power and reasonable absorption to melt the material would suffice as a laser source.” (Final OA, bottom of page 3). However, power and “reasonable absorption” are unrelated to modulation. Accordingly, *prima facie* obviousness has not been established.

### **Conclusion**

In conclusion, for the arguments of record and the reasons set forth above, all pending claims of the subject application continue to be in condition for allowance and Appellants seek the Board’s concurrence at this time.

Respectfully submitted,

Date: Sept. 2, 2009

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**APPENDIX A**  
**CLAIMS ON APPEAL**

5. A method of depositing material on a substrate, comprising the steps of:  
heating the substrate with a high-power, rapid-response diode laser to create a melt pool in a laser interaction zone;  
feeding material into the melt pool to create a deposit having a physical dimension;  
monitoring the laser interaction zone directly, without using any source of energy other than the diode laser used to heat the substrate, to generate an optical signal indicative of the physical dimension;  
and  
controlling the deposition using the optical signal.
6. The method of claim 5, wherein the deposition is controlled by modulating the laser.
7. The method of claim 6, wherein the modulation of the laser is in the kilohertz range.
8. The method of claim 6, wherein the modulation of the laser is up to 20 kHz.
9. A method of depositing material on a substrate, comprising the steps of:  
a) heating the substrate with a high-power, rapid-response diode laser to create a melt pool in a laser interaction zone;  
b) feeding material into the melt pool to create a deposit having a physical dimension;  
c) monitoring the laser interaction zone directly, without using any source of energy other than the diode laser used to heat the substrate, to generate an optical signal indicative of the physical dimension;  
d) feeding the optical signal to the laser to adjust the output of the laser; and  
e) repeating steps c) and d) at a rate of up to 20 kHz to achieve a desired physical dimension.

**APPENDIX B**

**EVIDENCE**

None.

**APPENDIX C**

**RELATED PROCEEDINGS**

None.